greatly the value of the book for students in America, who will find it very useful for this reason.

The alteration in the title of the second group of igneous rocks, according to the classification followed in this book, namely, from that of Intrusive to that of Hypabyssal, has not obviated the necessity for the apology made in the introduction to this group of rocks in the first edition, which is repeated in the second. The newer term is as inappropriate as the former one, and the criticism made in the review of the first edition holds with equal force in the present case.

J. P. I.

Rocks, Rock Weathering and Soils. By G. P. MERRILL. 8vo. 411 pp., Macmillan & Company, New York, 1897.

This admirable work brings together three subjects closely consecutive in the processes of nature but not previously associated as the subject of equally elaborate treatment in their mutual relations. The main emphasis of the work is placed on rock weathering, the description of rocks being in the main preliminary to this and that of soils a natural sequence. No attempt is made to treat rocks as such in an exhaustive way, nor soils as such. The discussion of weathering on the other hand is made as exhaustive as the present state of science will permit. The 168 pages of Parts 1 and 2 relating to minerals and rocks embrace a reasonably satisfactory treatment of these themes. This is as much perhaps as can be said of any attempt in this line in the present unfortunate condition of the classification and nomenclature of rocks and minerals. The relative fullness of treatment of the several rocks is measured in a degree by their importance in the production of soils. Very properly prominence is given to chemical composition, since this is a prime consideration in following the transition of the rocks into soils and secondary rocks. The numerous tables of analyses are a valuable feature. The use of terms is conservative and many of the intermediate stages in the gradation of one rock into another are left without specific nomenclature. The author files a protest against the tendency "which has resulted already in such monstrosities of nomenclature as *ouachitite*, *monchiquite*, *yogosite* and *absarokite*."

The subject of weathering and transportation occupies the heart of the book and constitutes its distinguishing feature. After a statement of the principles of weathering and of the agencies involved, the special

modes of alteration of the leading rocks are discussed in detail. Perhaps the most valuable contribution of the book is the series of analyses of identical rock at varying stages of decomposition, by means of which the nature of the process, in so far as it is chemical, is specifically and precisely indicated. These tables show in just what degree the process acts differentially upon the several constituents of the rock. Although the analyses are not sufficiently numerous to warrant very broad generalizations, they are very helpful in giving approximate knowledge of the relative parts played by the several constituents of rock in the disintegrating process. The results of the analyses are conveniently indicated in separate columns which severally show the percentage of loss for the entire rock, the percentage of each constituent saved, and the percentage of each constituent lost. These special studies are followed by a résumé embracing general deductions drawn from them.

The chapter on the physical manifestations of weathering treats of the more familiar effects of the process on texture, color, surface configuration and similar features. This is followed by an interesting chapter on time considerations, in which are treated the rates of weathering and the influence of position, texture, composition, humidity, temperature and other climatic conditions upon the progress of the process.

The mantle of loose material which results from the weathering, together with loose material accumulated on the surface by other agencies, the author designates *regolith* (mantle rock), and devotes the last 100 pages to its description. It is not altogether clear whether the simple fact of mantling the surface with loose material is sufficient to unify accumulations arising from quite diverse agencies and varying greatly in nature, and hence to call for a specific name of the petrographic form. The residuary clays and earths constitute a unitary formation derived directly by the processes of weathering. The glacial, eolian, and similar deposits can only be brought into the same category by largely neglecting their mode of origin and confining attention merely to their superficial disposal and their incoherent character. It may well be questioned whether the genetic factor in these cases will not usually be the one to be kept at the front, and be more often placed in contrast to the residuary earths than merged with them. Doubtless, however, the mantling feature which they possess in common will make the term regolith often convenient. The word at any rate may be left to stand or fall as experience shall dictate.

The discussion of the soils is relatively less satisfactory than most other portions of the book, but this is a subject so large in itself that a satisfactory treatment could not be expected as a theme subordinate to so broad a subject as the central topic of the book.

The essence of several of the sections on weathering were published in this JOURNAL while the author was engaged upon the studies which have taken form in this book and its readers are familiar with the excellent method of their treatment and their substantial character.

C.